

SP-E8 Temperature Impacts of Pumpback Operation on Oroville Reservoir Cold Water Pool

October 25, 2002

1.0 Introduction/Background

Water from the Thermalito Complex is pumped back up into the Oroville Reservoir for power generation purposes. Since the water in the Thermalito Complex is typically warmer than the water that is being released from Oroville Reservoir there is a concern that pumpback operations are returning warmer water to Oroville Reservoir and having a negative impact on the cold water pool in the reservoir. There is currently no data available on this phenomenon.

2.0 Study Objective

The purpose of this study is to quantify the impact of pumpback operations on the cold water pool in Oroville Reservoir.

3.0 Relationship to Relicensing /Need for the Study

As part of the relicensing process questions have been raised about the potential impacts of pumpback operations at Hyatt Powerplant on Oroville Reservoir temperatures. There is no existing data available to answer these questions. This study is designed to address the issue.

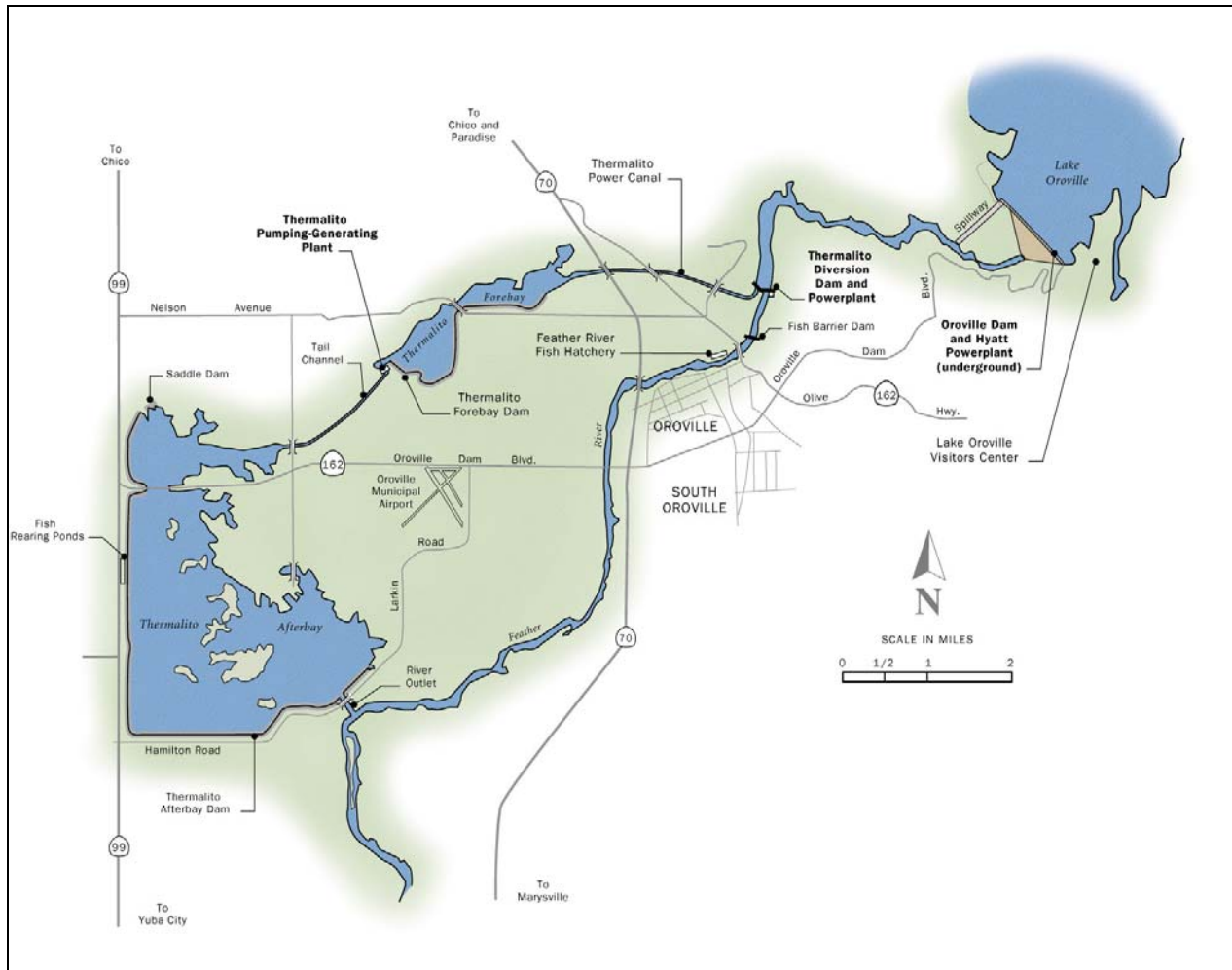
The purpose of this study is to quantify the impacts of pumpback operations at Hyatt Powerhouse on the cold water pool in Oroville Reservoir. This information is required to see if the impact is sufficient to justify consideration in Oroville Reservoir temperature model development and application or if it can be ignored in the analysis.

Engineering and Operations Issues Addressed

- E4—evaluate environmental and economic aspects of different flow regimes of Oroville Facilities operations. Factors to be considered include timing, magnitude and duration of flows, pump-back scheduling and maintenance scheduling, and hatchery operations.
- E6—effect of ramping rates on downstream facilities, power generation, water supply, water temperatures, and fish.
- E12—evaluate operational and engineering alternatives including selective withdrawal from Lake Oroville, Thermalito Afterbay, the hatchery, and the low flow section to meet various downstream temperature requirements.
- E14—evaluate operational alternatives that balance and maintain acceptable water quality standards including those for MTBE under all operational plans and conditions.

4.0 Study Area

The study area includes the Oroville Reservoir and the Thermalito Forebay – Afterbay complex.



Background on Oroville Pumpback Operations

Operation of the Oroville Facilities during a typical week involves delivering water to local water districts, regulating flows to the Feather River, and maximizing power generation.

The Thermalito Forebay conveys generating and pumping flows between the Thermalito Power Canal and Powerplant and provides regulatory storage and surge damping for the Hyatt-Thermalito Complex. The Thermalito Afterbay provides storage for pumpback operations to Lake Oroville and regulates power system operations. In addition, the Afterbay produces uniform flow in the Feather River and furnishes water to local districts.

During a normal week, Thermalito Complex storage is elevated during the daytime and weekdays and drawdown during the night and on Sundays. The normal operational elevation for the Forebay and Afterbay ranges from 221 feet to 225 feet and 124 feet to 136 feet, respectively.

During on-peak hours when the value of energy is high, water in excess of local and downstream requirements is released from Oroville for power generation and stored in Thermalito Afterbay. During off-peak hours when the cost of power is low, the excess water released during the day for power generation is conserved by pumpback operations through Hyatt and Thermalito powerplants into Lake Oroville.

On the average, pumpback operations range from 0.2 percent to 15 percent of the annual total Hyatt-Thermalito Complex power generation. In an effort to conserve water supply, pumpback operations are usually performed more often in dry water years than wet water years.

5.0 General Approach

The general approach will involve collection and analysis of historic and current field data collected during generation/pumpback operations at Hyatt Powerplant. Initial discussions with DWR operators have shown that the required data does not currently exist and additional instrumentation and data collection will be required.

Task 1—Review Existing Data

This task will review existing data on pumpback operations and Oroville Reservoir temperature profiles.

Task 2—Install Required Temperature and/or Reservoir Profile Sensors

This task will be to define locations where additional temperature and/or operational data may be required in order to perform the analysis. Instrumentation to collect the data will be installed. Desirable temperature information includes:

- Reservoir profile(s) around intake structure;
- Penstock Temperature;
- Hyatt Tailrace Temperature; and,
- Diversion pool temperature.

Task 3—Perform Pumpback Tests

This task involves the collection of data during periods of release and pumpback operations. The data collected will include:

- Release flow and temperature;
- Pumpback flow and temperature; and,
- Oroville Reservoir temperature profiles around the Hyatt intake structure.

Data collection efforts done during normal pumpback operations will be utilized to the maximum extent possible. If the normal pumpback operations do not provide sufficient data for the analysis additional, targeted pumpback operations may be required to provide the required data. These targeted pumpback operations will be closely coordinated with DWR operations personnel to minimize any potential impacts to normal water or power operations at the Oroville – Thermalito Complex.

Task 4—Analyze the Results

The observed data will then be analyzed to see if the pumpback operations have an impact on the cold water pool in Oroville Reservoir.

Task 5—Write Final Report

Complete a report documenting the procedures and results of the evaluation. The report will include recommendations on how pumpback impacts on Oroville cold water pool and operations should be handled in the Oroville Reservoir temperature modeling for the relicensing process.

6.0 Results and Products/Deliverables

Results

The results of this study will provide information on pumpback impacts on Oroville cold water pool and temperature operations. This information will be useful in both Oroville Reservoir Temperature model development and in the performance of alternative operational simulations during the relicensing process.

Products/Deliverables

The final deliverable of this study will be a report on the impacts of pumpback operations on Oroville cold water pool and temperature operations. The report will be suitable for use in model development and simulations to provide guidance on appropriate operation requirements and/or guidelines for temperature in the Lower Feather River.

7.0 Coordination and Implementation Strategy

Coordination with Other Resource Areas/Studies

This study will be coordinated with a number of other Engineering and Operation study plans:

- Study Plan #1c—Oroville Reservoir Temperature Model Development

-
- Study Plan #1e—Feather River Temperature Model Development
 - Study Plan #2—Modeling Simulation

8.0 Study Schedule

This section to be developed